REMARKS

Applicant requests favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

To place the subject application in better form, the specification has been amended to correct minor informalities. No new matter has been added by these changes.

Claims 1-15, 17-35, 37-47, 49-51 and 53-55 are presented for consideration. Claims 1, 6-8, 20, 21, 26-28, 40, 49-51 and 53-55 are independent. Claims 16, 36, 48 and 52 have been canceled without prejudice to or disclaimer of the recited subject matter. Claims 1, 2, 6-8, 20-22, 24, 26-28, 40-42, 45, 47, 49-51 and 53-55 have been amended to clarify features of the invention. Support for these changes can be found in the application, as filed. Therefore, no new matter has been added.

Applicant requests favorable reconsideration and withdrawal of the objection and rejections set forth in the above-noted Office Action.

Claims 1, 3, 5, 9, 11-15 and 17-19 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,252,648 to Hase et al. Claims 1-5, 9-15, 17-19, 21-25, 29-35, 37-39, 48 and 52 were rejected under 35 U.S.C. § 102 as being anticipated by PCT Publication No. WO 00/31780. Claims 41-47 were rejected under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,252,648 to Hase et al. in view of U.S. Patent No. 6,385,497 to Ogushi et al. Applicant submits that the cited art, whether taken individually or in combination, does not teach many features of the present invention, as previously recited in claims 1-5, 9-15, 17-19, 21-25, 29-35, 37-39, 41-48 and 52. Therefore, these rejections are respectfully traversed.

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Applicant notes, however, that claims 6-8, 16, 20, 26-28, 36, 40, 49-51 and 52-55 have been indicated as containing allowable subject matter. Accordingly, Applicant has taken the following steps in order to expedite allowance of the subject application. The subject matter of claim 16 has been substantively incorporated in independent claim 1, while the subject matter of claim 36 has been substantively incorporated in independent claim 21. In addition, Applicant has incorporated the subject matter of prior independent claim 1 into each of claims 6-8 and 20, so that these claims have been rewritten independent form. Likewise, Applicant has incorporated the subject matter of prior independent claim 21 into each of claims 26-28 and 40, so that these claims have been rewritten in independent form. Similarly, Applicant has incorporated the subject matter of prior independent claim 48 into each of claims 49-51, so that these claims have been rewritten in independent form. Still further, Applicant has incorporated the subject matter of prior independent claim 52 into each of claims 53-55, so that these claims have been rewritten in independent form. In so doing, Applicant believes that each of independent claims 1, 6-8, 20, 21, 26-28, 40, 49-51 and 53-55, as presented, should be in allowable form.

For the foregoing reasons, Applicant submits that the present invention, as recited in independent claims 1, 6-8, 20, 21, 26-28, 40, 49-51 and 53-55, is patentably defined over the cited art, whether that art is taken individually or in combination.

The dependent claims also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

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Applicant further submits that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicant's undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,

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Attorney Docket No. 03560.002760.

APPENDIX A

IN THE SPECIFICATION:

Please substitute the paragraph beginning at page 2, line 5, and ending on page 3, line 3, with the following.

-- However, a laser beam in a wavelength region less than approximately the wavelength of the ArF excimer laser beam is absorbed by oxygen in air and the transmission of the laser beam is lowered. To cope with this problem, in an exposure apparatus using the ArF excimer laser beam, almost all the air in the light path of the exposure light is replaced with nitrogen. Further, since a laser beam is somewhat absorbed even by nitrogen in a wavelength region of approximately 190 nm or less (the vacuum ultraviolet region), nitrogen must be replaced with another gas ([i.e.,on] i.e., an inactive gas other than nitrogen), which permits the laser beam to pass therethrough, or the interior of the exposure apparatus must be evacuated. However, in order to evacuate the exposure apparatus, the apparatus must be strongly constructed so as to withstand high pressure, increasing the manufacturing cost of the apparatus. Thus, a system for replacing the gas in the light path of the exposure light with any of other gases having a high degree of transmission is employed. It is contemplated to be most preferable to replace the atmosphere in the vicinity of the light path of the exposure light and the atmosphere in the

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vicinity of optical elements of the exposure apparatus with helium, in consideration of safety, good heat conductivity, a smaller change in reflective index due to temperature, and the like. --

Please substitute the paragraph beginning at page 3, line 7, with the following.

-- In view of the problem of the conventional example, it is an object of the present invention to instantly replace the air in a vessel, which hermetically seals the vicinity of the light path of exposure light in a semiconductor exposure apparatus, with [an other] <u>another</u> gas. --

Please substitute the paragraph beginning at page 6, line 20, with the following.

-- It is preferable that the illuminant be an illuminant of [on] an F2 laser or Ar2 laser. --

Please substitute the paragraph beginning at page 23, line 18, and ending on page 24, line 1, with the following.

-- Further, the above-mentioned reticle stage 9 moves in the Y-direction as the scanning direction (and sometimes also in the X-direction) along the reference plane formed on the external cylinder 24. In the embodiment, the reticle stage [19] <u>9</u> is supported in a non-contact state with respect to the external cylinder 24 by a guide using gas bearings. Note that the guide for supporting the reticle stage 9 also may use a rolling guide using balls or a sliding guide using rollers in place of the gas bearings. --

Please substitute the paragraph beginning at page 33, line 10, with the following.

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-- While the same gas supply port, gas exhaust port and ventilation ports are used for nitrogen and helium in the above description, the embodiment is not limited thereto. For example, the gas supply port for nitrogen may be disposed at the end of the chamber 4 on the illumination side and the gas supply port for helium may be disposed at the end of the chamber 4 on the exposure apparatus side. Further, in view of the specific gravities of nitrogen and helium, the positions of the ventilation ports, which are important in the formation of the flow path through the chamber 4, may [be] differ between a time when nitrogen is supplied and a time when helium is supplied. This may be realized by providing [operable] <u>openable</u>/closable ventilation ports and selectively closing and opening them depending upon the type of gas being supplied. --

Please substitute the paragraph beginning at page 34, line 22, with the following.

-- In Fig. 1, a gas supply source 57 includes <u>a</u> nitrogen gas supply source 57a and a helium gas supply source 57b. These two types of gases exhibit an excellent transmissivity to an F2 laser beam. --

Please substitute the paragraph beginning at page 36, line 22, and ending on page 37, line 6, with the following.

-- Note that the gas supplied from the gas supply port 59 flows through the interior of the cabinet 6, flows along the light path between the condensers 302 and 305, and [a] passes through the ventilation hole 303 in the support table 304, and is discharged from the gas discharge port

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60. The gas flow path in the chamber 6 is conceptually shown by arrows in Fig. 4. The provision of the gas flow path which sequentially passes through the spaces between optical elements in the chamber 6 permits the air in those spaces to be effectively displaced by the gas. --

Please substitute the paragraph beginning at page 38, line 14, and ending on page 39, line 1, with the following.

-- According to this embodiment, while the same gas supply port, gas exhaust port and ventilation ports are used for nitrogen and helium, the invention is not limited thereto similarly to the case of the above-mentioned chamber 4. Further, in view of the specific gravities of nitrogen and helium, the positions of the ventilation ports which are important in the formation of the flow path in the cabinet 6, may differ between a time when nitrogen is supplied and a time when helium is supplied. This may be realized by providing [operable] <u>openable</u>/closable ventilation ports and selectively closing and opening them depending upon the type of gas being supplied, similarly to the case of the above-mentioned chamber 4. --

Please substitute the paragraph beginning at page 41, line 13, and ending on page 42, line 11, with the following.

-- According to this embodiment, while the same gas supply port, gas exhaust port and ventilation ports are used for nitrogen and helium, the invention is not limited thereto, similarly to the case of the above-mentioned chamber 4. In particular, when gas in the projection optical system 13 with a vertical optical axis is replaced, it is preferable to dispose a gas supply port on

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an upper and lower portion of the projection optical system 13 and to dispose a gas discharge port on an upper and lower portion thereof, in consideration of the different specific gravities of nitrogen and helium. In this case, nitrogen may be supplied from the gas supply port disposed at a lower portion of the projection optical system 13 and helium may be supplied from the gas supply port disposed at the upper portion thereof. Further, in view of the specific gravities of nitrogen and helium, the positions of the ventilation ports, which are important in the formation of the flow path in the projection optical system 13, may differ between a time when nitrogen is supplied and a time when helium is supplied. This may be realized by providing [operable] <u>openable</u>/closable ventilation ports and selectively closing and opening them depending upon the type of gas being supplied, similarly to the case of the above-mentioned chamber 4. --

Please substitute the paragraph beginning at page 44, line 3, with the following.

-- A gas supply source 107 supplies an inactive gas, which, in this embodiment, is[,] helium gas or nitrogen gas. --

Please substitute the paragraph beginning at page 45, line 22, and ending on page 46, line 3, with the following.

-- Since the air in the chamber 26 is replaced with helium gas or nitrogen gas, the oxygen and ozone concentrations in the chamber 26 are at [a] very low levels. However, a very minute amount (for example, on the order of ppm or less) of ozone and/or oxygen which still remains in the chamber 26 can be removed by the ozone/oxygen removing mechanism 501. --

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Please substitute the paragraph beginning at page 46, line 6, with the following.

-- While an ion exchange type filter and an activated carbon type filter are commonly used chemical filters for [his] <u>this</u> purpose, a ceramic porous body type filter is used in this embodiment. --

Please substitute the paragraph beginning at page 51, line 14, and ending on page 52, line 5, with the following.

-- The pressure of the gas supplied from piping 80 is detecting by a pressure gauge 701 and the flow rate of the gas is adjusted to a predetermined value using a control valve 702 that is controlled by the controller 78. The gas then passes through a collection pump 703, after which it is temporarily stored in a buffer tank 704, before being compressed to a predetermined pressure by a compressor 705 and supplied to pipings 81a to 81c. Further, an auxiliary <u>line</u>, by which the gas can be exhausted by an exhaust pump 706, branches off at a point between the pressure gauge 701 and the control valve 702. When it is necessary to exhaust the gas, an amount of gas to be exhausted is controlled by a mass flow controller 708 in response to a result detected by a pressure gauge 707 of the buffer tank 704. Note that the mass flow controller 708 is controlled by the controller 78 (Fig. 1) in response to a result detected by the pressure gauge 707. --

Please substitute the paragraph beginning at page 64, line 15, and ending on page 65, line 18, with the following.

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-- Next, a process for manufacturing a semiconductor device making use of the manufacturing system described above will be explained. Fig. 12 shows a flowchart of the overall manufacturing process of the semiconductor device. At step 1 (circuit design step), a circuit of the semiconductor device is designed. At step 2 (mask making step), a mask on which a designed circuit pattern is formed is made. At step 3 (wafer making step), a wafer is made using a material such as silicon or the like. Step 4 (wafer processing step) is called an upstream process in which an actual circuit is formed on the wafer by lithography using the mask and the wafer which were prepared in previous steps. Step 5 is called a downstream process in which semiconductor chips are made using the wafer made at step 4. Specifically, step 5 includes an assembly step (dicing and bonding steps), a packaging step (chip encapsulating step), and the like. After step 6 (inspection step), inspections are carried out to confirm the operation, durability and the like of the semiconductor device made in step 5. The semiconductor device is completed through the above steps and shipped in step 7. The upstream process and the downstream process are carried out in different dedicated factories, and maintenance of the manufacturing apparatuses of each factory is performed by the remote maintenance system described above. Further, information as to production management and maintenance of the manufacturing apparatuses is also transmitted between the factory of the upstream process and the factory of the downstream process through the Internet or a private line network. --

Please substitute the paragraph beginning at page 66, line 19.

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-- Except as otherwise [disposed] disclosed herein, the various components shown in outline or in block form in the figures are individually well known and their internal construction and operation are not critical either to the making or using of this invention or to a description of the best mode of the invention. --

IN THE CLAIMS

1. (Amended) An exposure apparatus, comprising:

a chamber surrounding a predetermined space;

a first gas supply unit for supplying a first gas into said chamber;

a second gas supply unit for supplying a second gas, different from the first gas, into said chamber, wherein the first and second gases contain substantially no oxygen; and

a switching mechanism for supplying one of the first and second gases by switching between said first and second gas supply units.

2. (Amended) [A] An exposure apparatus according to claim 1, wherein said chamber initially contains air, and the air in said chamber is replaced with the first gas, after which the first gas in said chamber is replaced with the second gas.

6. (Amended) An exposure apparatus [according to claim 5], comprising:

a chamber surrounding a predetermined space;

a first gas supply unit for supplying a first gas into said chamber;

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a second gas supply unit for supplying a second gas, different from the first gas, into said chamber; and

a switching mechanism for supplying one of the first and second gases by switching between said first and second gas supply units,

wherein said chamber includes a gas supply port for the first gas and a gas supply port for the second gas, and the gas supply port for the first gas is different from the gas supply port for the second gas.

7. (Amended) An exposure apparatus [according to claim 5], comprising:

a chamber surrounding a predetermined space;

a first gas supply unit for supplying a first gas into said chamber;

a second gas supply unit for supplying a second gas, different from the first gas, into said chamber; and

a switching mechanism for supplying one of the first and second gases by switching between said first and second gas supply units,

wherein said chamber includes a gas exhaust port for the first gas and a gas exhaust port for the second gas, and the gas exhaust port for the first gas is different from the gas exhaust port for the second gas.

8. (Amended) An exposure apparatus [according to claim 5], comprising:

a chamber surrounding a predetermined space;

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a first gas supply unit for supplying a first gas into said chamber;

a second gas supply unit for supplying a second gas, different from the first gas, into said chamber; and

a switching mechanism for supplying one of the first and second gases by switching between said first and second gas supply units,

wherein said chamber includes a ventilation port for the first gas and a ventilation port for the second gas, and the ventilation port for the first gas is disposed differently from the ventilation port for the second gas.

20. (Amended) An exposure apparatus [according to claim 1], comprising:

a chamber surrounding a predetermined space;

a first gas supply unit for supplying a first gas into said chamber;

a second gas supply unit for supplying a second gas, different from the first gas, into said chamber; and

a switching mechanism for supplying one of the first and second gases by switching between said first and second gas supply units,

wherein the second gas is helium and the first gas is nitrogen.

21. (Amended) A gas replacement method, comprising the steps of:

suppling a first gas into a chamber surrounding a predetermined space; and

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supplying a second gas, different from the first gas, into the chamber, after the first gas is supplied, wherein the first and second gases contain substantially no oxygen.

22. (Amended) A gas replacement method according to claim 21, wherein one of the first gas and the second gas is supplied into the chamber by switching between a first gas supply unit for supplying the first gas and a second gas supply unit for supplying the second gas.

24. (Amended) A gas replacement method according to claim 21, wherein an amount of the first gas supplied per unit time is different from an [mount] amount of the second gas supplied per unit time.

26. (Amended) A gas replacement method [according to claim 25], comprising the steps of:

suppling a first gas into a chamber surrounding a predetermined space; and

supplying a second gas, different from the first gas, into the chamber, after the first gas is supplied,

wherein a gas supply port for supplying the first gas in the chamber is different from a gas supply port for supplying the second gas in the chamber.

27. (Amended) A gas replacement method [according to claim 25], comprising the steps of:

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suppling a first gas into a chamber surrounding a predetermined space; and

supplying a second gas, different from the first gas, into the chamber, after the first gas is supplied,

wherein a gas exhaust port for exhausting the first gas from the chamber is different from a gas exhaust port for exhausting the second gas from the chamber.

28. (Amended) A gas replacement method [according to claim 25], comprising the steps of:

suppling a first gas into a chamber surrounding a predetermined space; and

supplying a second gas, different from the first gas, into the chamber, after the first gas is supplied,

wherein a ventilation port for the first gas in the chamber is disposed differently from a ventilation port for the second gas in the chamber.

40. (Amended) A gas replacement method [according to claim 21], comprising the steps of:

suppling a first gas into a chamber surrounding a predetermined space; and

supplying a second gas, different from the first gas, into the chamber, after the first gas is supplied,

wherein the second gas is helium and the first gas is nitrogen.

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41. (Amended) A method of manufacturing a semiconductor device, comprising the following steps:

installing a group of manufacturing apparatuses,

including the exposure apparatus of claim 1, for [forming] performing various processes in a semiconductor manufacturing factory; and

manufacturing the semiconductor device through a series of the various processes using the group of manufacturing apparatuses.

42. (Amended) A method of manufacturing a semiconductor device according to claim 41, further comprising the following steps:

connecting the group of manufacturing apparatuses to one another through a local area network; and

transmitting information as to at least one manufacturing apparatus of the group of manufacturing apparatuses between the local area network and an external network outside of the semiconductor manufacturing factory by means of a data communication link.

45. (Amended) A method of maintaining an exposure apparatus, comprising the steps of:

providing [a] maintenance for an exposure apparatus of claim 1, which is a database, connected to an external network of a semiconductor manufacturing factory;

permitting access to the maintenance database from the semiconductor manufacturing factory through the external network; and

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transmitting information stored in the maintenance database to the semiconductor manufacturing factory through the external network.

47. (Amended) An exposure apparatus according to claim 46, wherein a user or a vendor of the exposure apparatus can access a maintenance database provided by the other of the user or the vendor via an external network outside of a factory where the exposure apparatus is installed and obtain information from the maintenance database via the external network.

49. (Amended) [The] An exposure apparatus [of claim 48], comprising:

a chamber surrounding a predetermined space;

a first gas supply source for supplying a first gas into said chamber; and

a second gas supply source for supplying a second gas, different from the first gas, into said chamber,

wherein said chamber initially has a substantial oxygen content, but after the first gas and the second gas are sequentially supplied into said chamber, said chamber no longer has a substantial oxygen content,

wherein the first gas is nitrogen and the second gas is helium.

50 (Amended) [The] An exposure apparatus [of claim 48], comprising:

a chamber surrounding a predetermined space;

a first gas supply source for supplying a first gas into said chamber; and

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a second gas supply source for supplying a second gas, different from the first gas, into said chamber,

wherein said chamber initially has a substantial oxygen content, but after the first gas and the second gas are sequentially supplied into said chamber, said chamber no longer has a substantial oxygen content,

wherein the first gas is supplied into the chamber until the oxygen content in said chamber is reduced to less than [abut] about 0.00001 percent by volume, after which the second gas is supplied into said chamber until a concentration of the first gas in said chamber is reduced to less than about ten percent by volume.

51. (Amended) [The] An exposure apparatus [of claim 48], comprising:

a chamber surrounding a predetermined space;

a first gas supply source for supplying a first gas into said chamber; and

a second gas supply source for supplying a second gas, different from the first gas, into said chamber,

wherein said chamber initially has a substantial oxygen content, but after the first gas and the second gas are sequentially supplied into said chamber, said chamber no longer has a substantial oxygen content,

wherein the first gas is supplied into the chamber until the oxygen content in said chamber is reduced to about 0.000001 percent by volume or less, after which the second gas is

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supplied into said chamber until a concentration of the first gas in said chamber is reduced to about one percent by volume or less.

53. (Amended) [The] A method of [claim 52] reducing the oxygen content in a chamber that initially contains air, said method comprising the following steps:

first supplying a first gas into the chamber to substantially replace the air in the chamber;

next supplying a second gas, different from the first gas, into the chamber to substantially replace the first gas in the chamber,

wherein after the first gas and second gas have been sequentially supplied into the chamber, the chamber no longer has a substantial oxygen content,

wherein the first gas is nitrogen and the second gas is helium.

54. (Amended) [The] A method of [claim 52] reducing the oxygen content in a chamber that initially contains air, said method comprising the following steps:

first supplying a first gas into the chamber to substantially replace the air in the chamber;

next supplying a second gas, different from the first gas, into the chamber to substantially replace the first gas in the chamber,

wherein after the first gas and second gas have been sequentially supplied into the chamber, the chamber no longer has a substantial oxygen content,

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wherein the first gas is supplied into the chamber until the oxygen content in the chamber is reduced to less than about 0.00001 percent by volume, and the second gas is supplied into the chamber until a concentration of the first gas in the chamber is reduced to less than about ten percent by volume.

55. (Amended) [The] A method of [claim 52] reducing the oxygen content in a chamber that initially contains air, said method comprising the following steps:

first supplying a first gas into the chamber to substantially replace the air in the chamber;

next supplying a second gas, different from the first gas, into the chamber to substantially replace the first gas in the chamber,

wherein after the first gas and second gas have been sequentially supplied into the chamber, the chamber no longer has a substantial oxygen content,

wherein the first gas is supplied into the chamber until the oxygen content in the chamber is reduced to about 0.000001 percent by volume or less, and the second gas is supplied into the chamber until a concentration of the first gas in the chamber is reduced to about one percent by volume or less.

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